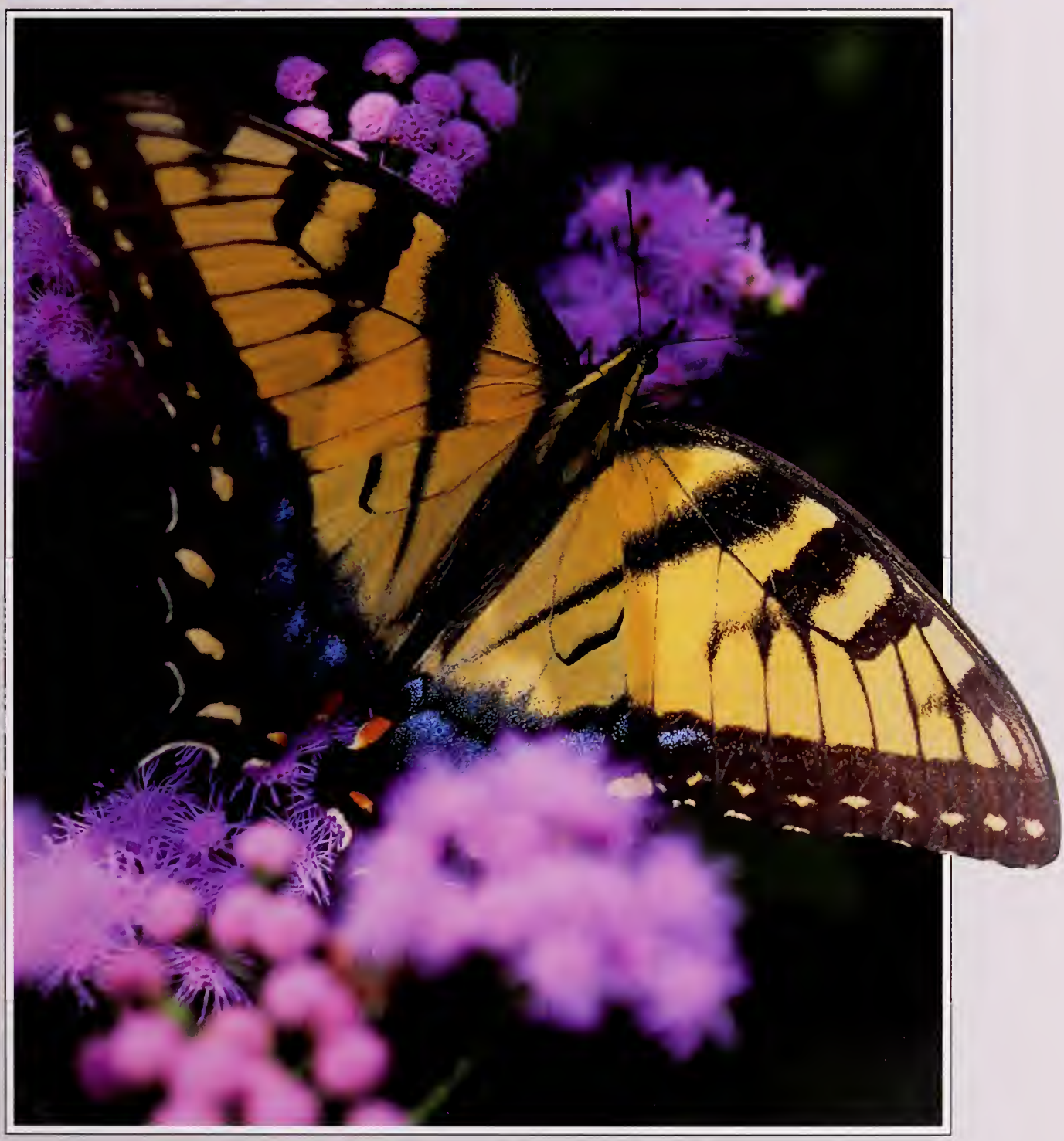
VIRGINIA WILDLIFE

AUGUST 1992 ONE DOLLAR



Out on a Limb

"All things have a soul. They just need to be woken up."—from *One Hundred Years of Solitude,* by Gabriel García Márquez.

Having recently visited many friends blessed with newborns, I've come to realize that without Winnie-the-Pooh and Beatrix Potter's ducks and rabbits, babyhood would be a very dull affair. Nothing is more enchanting than a baby's room all done up in white ruffles, with the rabbits, teddy bears, lions and other fanciful creatures of an artist's imagination sewn onto pillows, stencilled on walls and crafted into mobiles—all in homage to the magic of life itself lying curled up in an old-fashioned crib.

The preoccupation with the natural world continues throughout childhood, with the stories and legends of talking elephants, fairy princesses seated on mushrooms, and sea horses and mermaids leading humans on merry adventures. We cultivate in our children that imaginative spirit born of things wild and natural, and it is through this education that we are first introduced to the possibilities of life, its grandeur, mystery and danger. Then, as if all before was stuff and nonsense, one day we grow wise to the silly notion of flying reindeer and elves on the North Pole, and leave it all behind.

Or, perhaps, we just think we do. Once grown, it is true, we turn to the things that matter, like balancing checkbooks and getting to work on time. We return to the woods, the rivers, the deserts and the oceans only when we need to rest. Seldom do we revisit those sanctuaries that were the nurseries of our imagination to seek inspiration or indulge in flights of fancy.

Instead, we pooh-pooh the imaginative fun we had as youngsters as frivolous. We take things seriously, calling streets by numbers instead of names, worrying about what we should do rather than what we could do, and believing less in the possible than in the real.

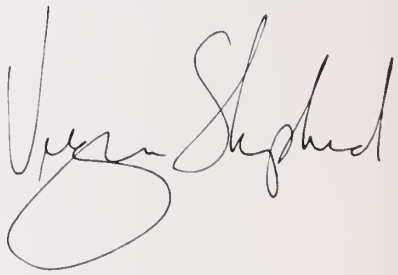
Still, once in awhile, we will come across evidence of a childhood not forgotten, and miracles of the imagination working once more to lead us to new discoveries. For example, deep in southwest Virginia living quietly underwater are some drably colored animals, attached to one place their entire lives. Nevertheless, commercial rivermen collecting mussels for the pearl button industry some 80 years ago transformed forever with a few choice words our perception of these animals. Who today can resist the attraction of a birdwing pearlymussel, a notched rainbow, a Cumberland monkeyface, or a purple lilliput freshwater mussel? And although on the surface it seems these names conjure up images these creatures could never possibly live up to, who knows what natural mysteries much more glorious and fantastic than their names lie between the two halves of a snapped-shut shell?

There are others in this world who have held onto the whimsical spirit of their youth. I think of actors and actresses performing in plays and movies, all of whom are indulging in pure flights of the imagination, made real by leaps of faith. And moviemakers spend millions of dollars creating a fantasy we will believe in. They make snow in the summer, paint leaves fall colors, change the beautiful to the ugly, the old to the young. And for two or three hours, they entice us into believing once more in pink elephants and talking monkeys. For a short time we believe that anything is possible.

Then we return to the serious business of living. It is funny to me how we regularly dismiss the importance of the imagination in our day-to-day lives, but as parents we readily immerse our children in the delights of tales about bears getting their heads stuck in honey jars, donkeys searching for tails, and rabbits pleading to be thrown into briar patches. When it comes to grownup delights, however, we can't seem to return to our childhood for inspiration. We've lost our sense of wonder and awe about the world around us, and wonder where all the fun in life has gone. But there is no doubt that the creative spirit is grounded in the natural world, and I believe if we just stuck our heads underwater with our eyes open once in awhile or looked at the world from the top of a tree sometime, we might feel again a rush of childish joy.

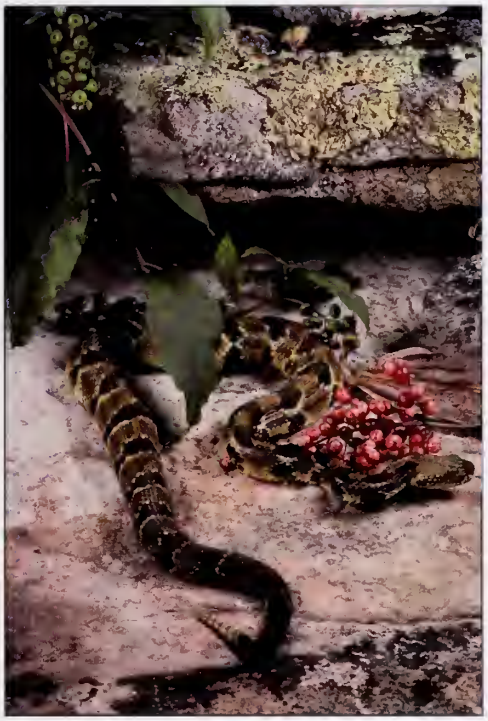
I hope very much that we don't let the importance of our connection to the natural world get too buried under the humdrum demands of everyday life. I believe it would be a terrible tragedy to find ourselves one day without a drab mussel to create a magical tale about, or a lovely butterfly to spin a story of true love around.

I hope it's not too late for us to realize that we need the natural world around us for our own well-being as much as we needed it as children. Besides, as much as I cherish Winnie-the-Pooh, stories of waterbabies and sad-eyed dragons, I should hate to think that someday we would have nothing rare and precious left in our own world to weave new stories about for sleepy babies to dream on.



James River; photo by Michael McCormack. See story on fish passage restoration beginning on page 11.

VIRGINIA WILDLIFE



Knowing your snakes means being able to identify the differences among individuals in any one species. For more details on variation in the snake world, turn to page 27 (photo by Rob & Melissa Simpson).

Cover: There's an art to capturing butterflies on film, like this tiger swallowtail photo by Dwight Dyke. See page 4 for tips for the butterfly photographer.

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Dedicated to the Conservation of Virginia's Wildlife and Natural Resources

VOLUME 53 NUMBER 8

Butterflies on Film

An introduction to butterfly photography

Story and photos
by David Liebman

Butterfly photography is a topic about which very little has been published. But, by following a few fundamental principles, and using the proper equipment, anyone can learn how to successfully photograph these colorful creatures.

The first step is to begin with the right equipment. Quality photo equipment is now affordable, and even though butterfly photography may be your first priority, the equipment recommended below can be used for close-up nature photography in general. When talking prices, the basic rule of thumb is to purchase the best you can afford.

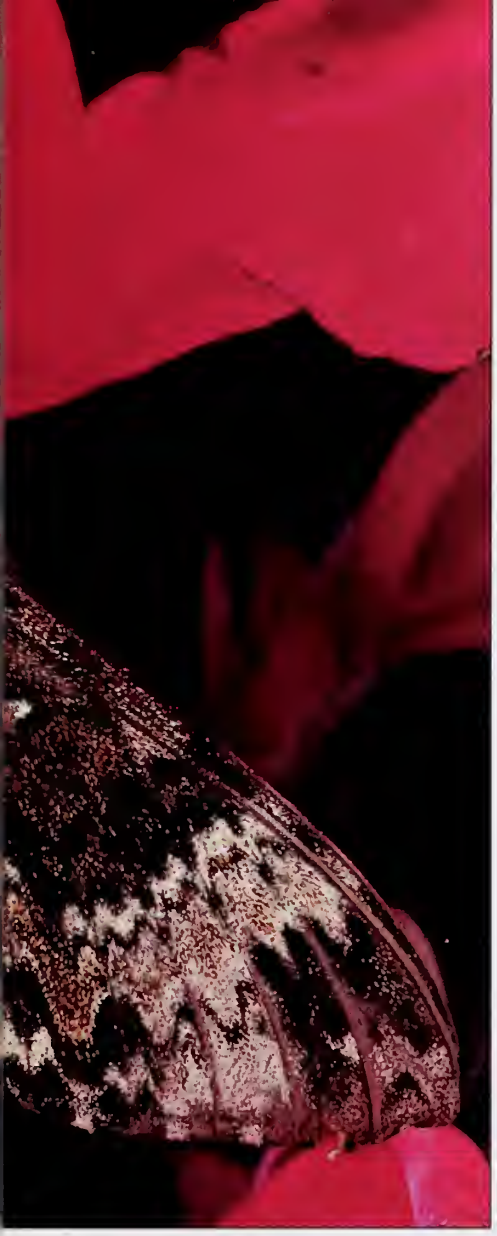
Cameras

A 35mm camera is used by the majority of nature photographers these days. It is a light camera when compared with larger format cameras, and it is comfortable to handle. My 35mm cameras are Nikons, but many other quality brands exist today that are quite good.

Auto-focus cameras are stylish, but are not necessary for butterfly photography unless one wishes to photograph butterflies in flight. The greatest challenge in catching a butterfly midair on film is to keep the subject central in the frame, as auto-focus readings are taken from the center of the viewfinder. If the subject is not centered, the lens may focus on objects in the background

Optics

Obviously, when you are trying to photograph a subject as small as a



Rustic Sphinx moth ***(above)*** *and bellows attached to camera* ***(right)****.*

butterfly, you must think hard about lenses. There are several options to consider.

If you only want to take occasional close-ups, the most inexpensive lens setup is to add a set of close-up or supplementary lenses to the front of a normal 50-55mm lens. These lenses usually come in sets of three, and work best if the main lens is stopped down to f/8 or more. If not, the supplementary lenses may produce aberrations at the image edges. A word of caution: No more than two lenses should be used at a time.

Another inexpensive route is to go with extension rings; metal tubes used to extend the lens beyond the camera body. They are usually available in groups of three, with a common set composed of 6 mm, 18 mm, and 25 mm. The 6 mm ring works best with larger butterflies and the 25 mm ring is best for small butterflies such as blues and coppers. A disadvantage in the use of extension rings, however, is that the camera lens must be very close to the subject. Unless the outside temperature is very low, or the butterfly has just emerged, such a close proximity to the lens could frighten the butterfly. An advantage is that lens magnification can be increased without image deterioration.

For the best results, however, you should shell out the money for a macro lens. Mine is a 55mm Macro Nikon. Most insect and small animal photographers, however, prefer to use a 105 mm macro as a bread-and-butter lens. The greatest advantage of the 105 mm over the 55 mm macro is that the longer focal length lens of the 105 mm allows more working distance between the camera and subject. Even with the 105 mm macro, though, the distance to a small butterfly is only six inches. A 200 mm lens allows an even greater camera to subject distance. And with this lens, the background area of view is smaller, thereby eliminating background distractions.

Macro zoom lenses, known as close-focus zooms, are heavier lenses and do not produce as sharp images in the close-up mode as the true macro lens. The weight problem is quite noticeable if one hand-holds the camera for a long period of time. Macro zooms in the macro mode work best with stationary subjects. If you wish to use a zoom lens, try those covering the 80-210 mm range.

Bellows, which extend the lens even further than an extension tube will, are great for super close-ups such as the head of an insect, eggs or to capture butterfly wing scales on film. They must be used with a tripod and/or flash in the field, unless no movement or wind exists.

Accessories

Tripods increase image sharpness of subjects by eliminating camera movement. Whenever you photograph in natural light, a tripod should be used to improve image quality. In addition, a tripod is indispensable for larvae and pupa photography.

Flashes can freeze movement, and give greater depth of field, and are of great value with active, moving butterflies and caterpillars. Mount your flash on a bracket above and to the side of the camera at a 30-40 degree angle to the film plane.

Film

All nature publishing photographers shoot slide film with excellent results. Most publishers will only accept slides for publication. When it comes to film type, the slower the ASA or film speed, the sharper the image. Kodachrome 25 is the slide film that sets the standard of comparison for other films. It is the finest grain slide film on the market, and works best with warm colors such as orange and yellow. Although

Wing scales, like those of the Cecropia moth **(#1)** *must be photographed with the use of a bellows.*

Some pupa are reflective, thus hot spots can appear. A polarizing filter reduces reflections and produces richer colors on a Variegated Fritillary pupa **(#2)**.

Note the differences in background when using a flash to photograph Mourning Cloaks. **#3** *was photographed with a flash, while* **#4** *was photographed using natural light.*

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Kodachrome 64 was once the leading film used by nature photographers, today many use Fujichrome 50 RF for blue or green subjects. Fujichrome Velvia is a good film, too, if you want to increase color saturation, but it is expensive.

Field Techniques

My internal dialogue while in the process of taking a photograph sounds something like this: "Here's the butterfly, plenty of flowers around, low wind. She will probably stay around for awhile, since it's early in the day, just getting warm, and she probably is hungry and hasn't eaten much. My best shot will be when the butterfly's upper wings face the sun side, giving me better color saturation, but I'll have to get in close from behind so as to prevent a shadow. Oops! Ugly sticks and dead flowers in the background. Wait for her to slightly change position on the flower. Now, there is a better contrast with the background. Gotcha! Click!"

Sounds easy, doesn't it? Well, you need to remember more than a few things when you're out in the field trying to capture butterflies on film.

First of all, butterflies are easily stimulated by bright colors. Therefore, be sure to wear muted shades of brown or green and wear a hat to prevent reflection from eyeglasses. Jewelry can also frighten butterflies, as can a hanging lens cap. Insect repellants also repel butterflies.

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Two flashes were used to photograph this Variegated Fritillary larva **(#5)**, *one to stop movement and one to lighten the background.*

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7 *To compensate for the yellow color of a Tiger Swallowtail (#6) while photographing in natural light, the f-stop was opened 1-1/2 stops from the stop recommended by the camera meter.*

When flash was used to photograph a Tiger Swallowtail (#7), the exposure compensation dial was set on +1. Bright yellow tricks the TTL system.

The best time of day to photograph butterflies depends on what you're looking for. Do you want a resting or a moving butterfly? Butterflies are most active during the hottest part of the day, and at rest when light conditions are lower. Cool fall mornings work well when butterflies are still basking in the sun to raise their body temperature.

A feeding butterfly makes a good photograph because the butterfly is interacting with the environment. Make sure a surface of the butterfly is parallel to the film plane and its eyes are in focus. At high magnification, sharp focus of legs and antenna becomes difficult. Remember that as magnification increases, depth of field decreases. Still, many depth problems can be solved by using a smaller aperture (lens opening) and/or adding flash.

Understanding a butterfly's feeding process will also help you shoot a better picture. When a butterfly is actively sucking nectar, its uncoiled proboscis (tongue) is not moving. However, you may only have a few seconds to take advantage of this situation, so observe the butterfly's tongue to get an estimate of its timing sequence.

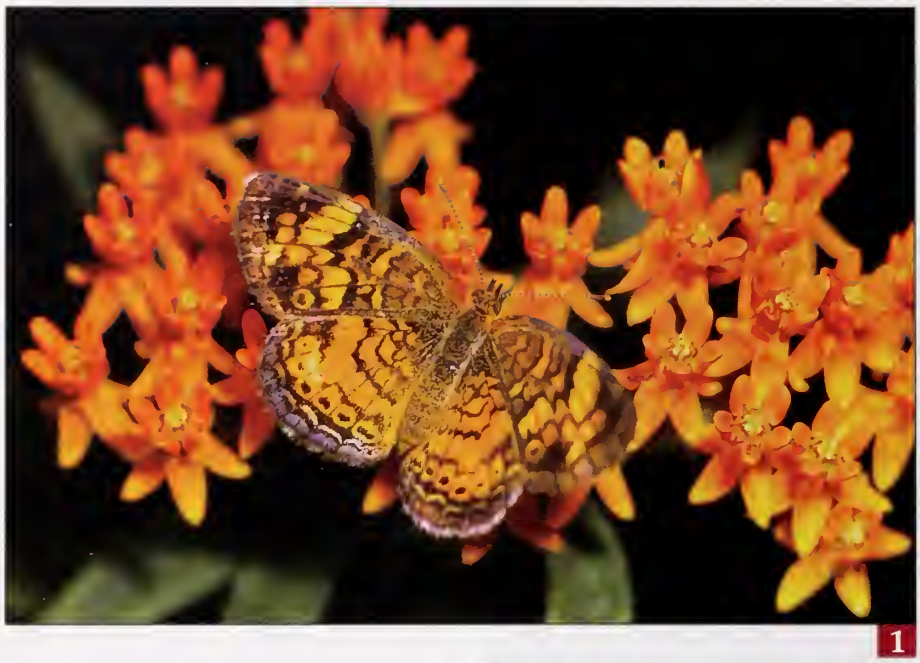
But where do you find your subjects? One easy way to find your subjects close to home is to plant a butterfly bush or lantana in your backyard. Butterflies and moths, however, are not all present at the same time, and most have between one to three peaks per warm season.

Many butterflies can be found at mudholes, or along streams. Others are forest butterflies, feeding on oak sap, and can be found on older, mature trees. These butterflies will remain stationary while sipping sap. However, many of these butterflies have underwings resembling dead leaves or bark, and many rest with their wings folded, which causes special problems. The key is that once you obtain side shots of butterflies with their wings folded, retreat, and approach from a position in which the open wings will be in view.

By slowly approaching any butterfly's safety area, it will open its wings in a ready position for flight. Any movement at this time will cause your subject to fly away, so wait a few minutes and approach as slowly as possible. Super slow motion is the key.

As you get closer, move even more slowly and be careful how you move. Sideways movement may also cause the butterfly to take flight. Occasionally, you may have to crawl or walk on your knees, so knee pads are useful on rocky or wet ground.

When your approach is within several feet, start snapping. Keep shooting pictures as you move in closer, in case the butterfly vanishes. When you safely get within inches, the butterfly usually will tolerate faster movement.



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Backgrounds

Your background is very important, as it can complement or distract from the subject you're trying to photograph. The good news is that you can often control the background. Many butterfly photographers will place a green or blue sheet in the distance to complement a butterfly's colors and eliminate an inappropriate background. Another option is to set your camera up in position by a particularly attractive flower or bush. This method may take longer to get a good picture, but can be effective if butterflies are known to visit that flower or bush. However, some blue flowers, such as ageratum, morning glories, asters, lobelia and phlox present a special problem. On slide film, they often show up as an unattractive shade of off pink or magenta which could weaken your slide color combination.

Flashes can also help or hinder a background. The use of a flash will tend to make a background dark. Flashes work if the background is too busy, though black or brown butterflies against a black background do not work well, since the background and butterfly appear to blend. In this situation, a second or third unit flash aimed at the background can make a lighter background. For night photography of moths a flash is necessary, and a black background looks normal.

If you have a flash with a through the lens (TTL) capability, it will not always produce correct exposures. Exposure cannot be changed, however, by changing the f-stops in the TTL mode. Instead, the + and- dial on the exposure compensation dial is used. If a butterfly is bright yellow or white, the compensation dial should be set at +1. If the subject is red, tan or orange with a close green background, no compensation is needed. If a darker insect is on a yellow, pink, or light blue flower, a +1/2 stop compensation often works.

3

Kodachrome 64 film brings out rich reds, pinks, oranges, and yellows in this photo of a Crescent butterfly **(#1)**.

Using either Ektachrome or Fujichrome will bring out blues and greens in subjects such as this Polyphemus moth larva **(#2)**.

A good time to photograph a Long-tailed Skipper is when it is basking in the sun **(#3)**.

Sap feeders such as this Large Wood Nymph **(#4)** *become intoxicated on fermented sap and often remain stationary for periods of time.*

A flat surface of the butterfly should be parallel to the film plane and the butterfly's eyes should be in focus as in this photo of a Diana **(#5)**.

To photograph a butterfly that is close to the ground from below (Variegated Fritillary, **#6**), *I lie on my back and slowly inch myself under the specimen. This takes time, however, and the butterfly often flies away.*

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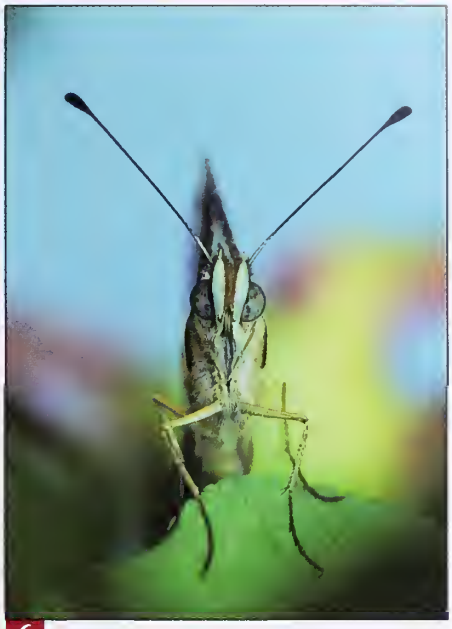

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7 *This Black Swallowtail (#7) is resting on a butterfly bush that looks pink but is actually violet. Many blue flowers appear on film as a washed-out magenta. A potential solution is to photograph on a cloudy day or use a cc 30c cyan filter over the flash.*

Final Tips

The weather is important. If it's windy, wait or use a flash. Butterflies will go in and out of focus on a windy day and will be more skittish. A hazy day is best for color saturation, but a completely overcast day usually means no feeding and butterfly wing colors will have a bluish cast.

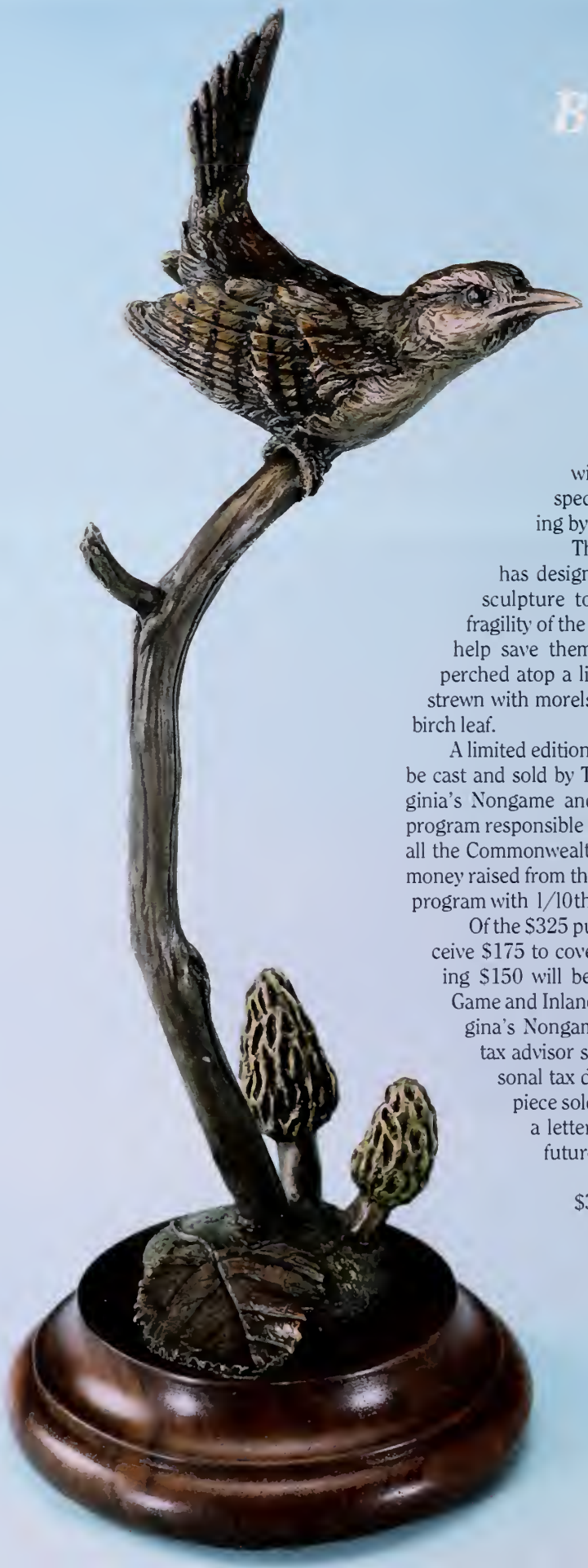
Always approach without casting a shadow on or near the butterfly. Keep as low to the ground as possible. If you need to reposition the butterfly because the background is poor, step in from outside the butterfly's range of comfort and try to get it to reposition itself, but don't get too close at this stage. Some butterflies frighten easily. A copper butterfly and some skippers may attack if one moves in too close or too fast.

Butterflies may rest when full of nectar. Then again, they may go out to find a mate or lay eggs, and then return to the same spot. One never knows.

Patience and practice in butterfly photography are vital. Don't worry! After a short time, camera operation will become second nature and you can begin to concentrate on the beauty and wonder of your colorful subjects. □

*David Liebman is an outdoor photographer and an expert on butterflies. **Virginia Wildlife** featured his tips on gardening for butterflies in August 91.*

Editor's note:
*You must find a copy of **Handbook for Butterfly Watchers** by Robert Michael Pyle (Houghton Mifflin Co. NY, 1984 and 1992) if you are thinking about going on a photographic quest for butterflies. This book offers detailed, practical information on butterflies, butterfly watching and photography, how to find butterflies, and even butterfly gardening and butterfly conservation. Additionally, it is an exquisitely written book that will charm you into taking to the field to meet a butterfly –today.*



Buy one for a Song

The cheerful *chip, chip, chip, de-da-a, te-dee* of the Bewick's wren is seldom heard in the mountains of Virginia anymore. Declared endangered in Virginia, the Bewick's wren represents just one of many species of wildlife whose survival is hanging by a thread in our state today.

Thus, David Turner of Turner Sculpture has designed this delicate 12-inch high bronze sculpture to draw attention to the beauty and fragility of the Commowealth's wildlife in an effort to help save them. The enchanting Bewick's wren is perched atop a limb that pokes up from a forest floor strewn with morels and a single rare Virginia round-leaf birch leaf.

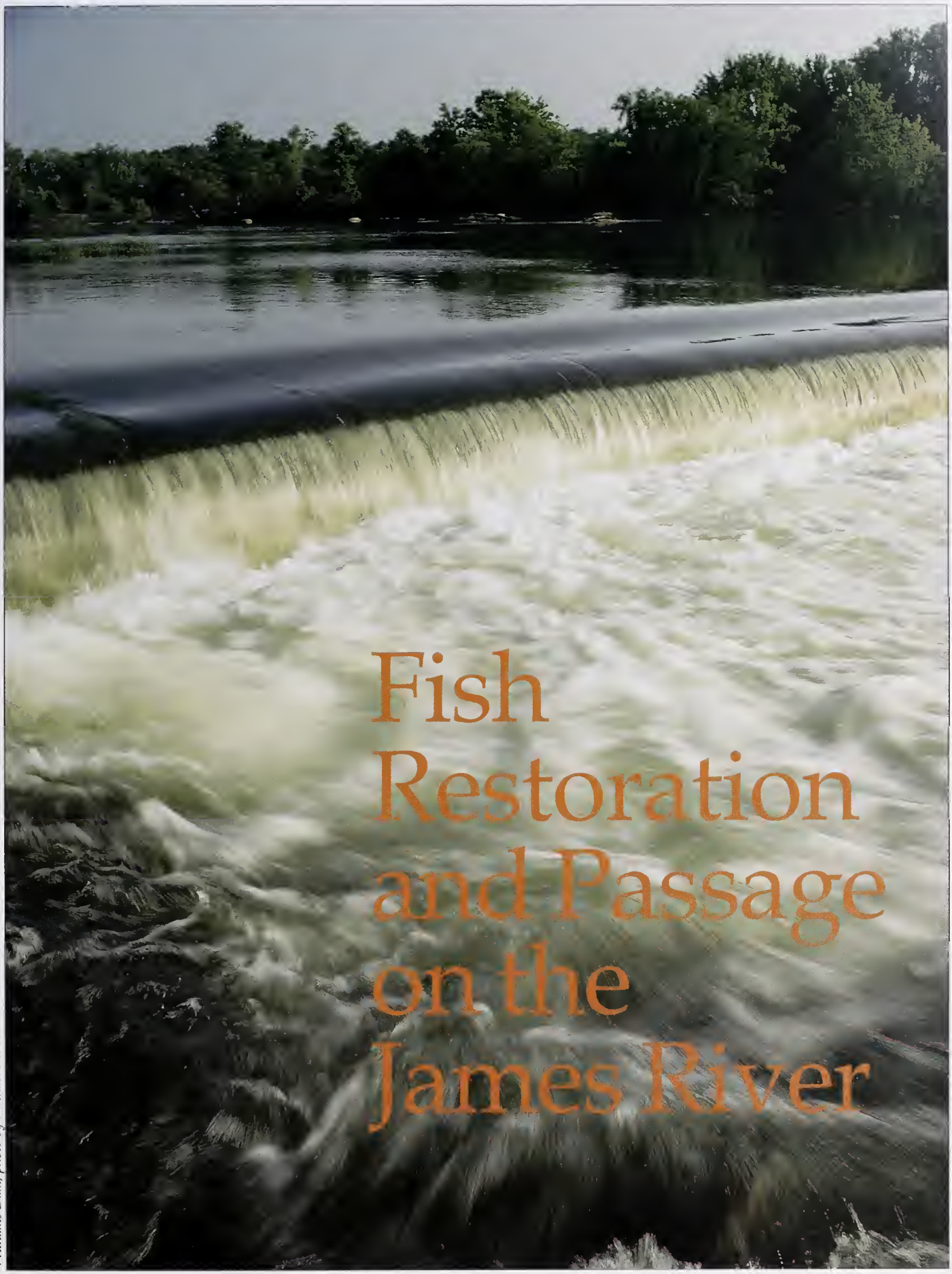
A limited edition of 200 of these bronze sculptures will be cast and sold by Turner Sculpture solely to benefit Virginia's Nongame and Endangered Species Program, the program responsible for the management and protection of all the Commonwealth's rare and endangered wildlife. The money raised from the sale of this sculpture will provide the program with 1/10th of its present operating budget.

Of the $325 purchase price, Turner Sculpture will receive $175 to cover their production costs. The remaining $150 will be sent to the Virginia Department of Game and Inland Fisheries as your contribution to Virgina's Nongame and Endangered Species Fund. A tax advisor should be consulted regarding the personal tax deductibility of this contribution. Each piece sold will include a certificate of origin and a letter confirming your contribution to the future of Virginia's wildlife.

Order your sculpture by sending a $325 check made out to Turner Sculpture to: Turner Sculpture, Box 128, Onley, VA 23418. For credit card orders, call: (804) 787-2818.

TURNER SCULPTURE

VIRGINIANS CARE
Nongame Wildlife Fund



Fish Restoration and Passage on the James River

Williams Dam; photo by Michael McCormack.

James River in Richmond; photo by Sarah White.

Historic stocks of migratory fish in the James River recently have dwindled to mere remnants of their previous levels. Overfishing, construction of dams, pollution, and habitat destruction all have combined to severely impact the populations of many migratory fish. Concerned federal, state, and local governments as well as private agencies and citizens have begun the difficult and costly task of reversing these population declines. Through careful management, dams are being breached and fishways constructed. Fish are being reintroduced into historic spawning and rearing areas, fishing is becoming regulated, and impaired habitat is being restored. The ultimate goal is to restore migratory fish to the James River to benefit the citizens of the Commonwealth.

The James River has long been known for its annual runs of migratory fish. Native Americans relied on the spring migrations of American shad returning from the Atlantic Ocean to spawn in coastal rivers and streams. Recent archaeological excavations of prehistoric sites near the western headwaters of the James River have uncovered large numbers of American shad bones, evidence that the species once traveled inland great distances from the ocean.

Early European colonists in Virginia marveled at the numbers of migratory fish, describing the runs as "unbelievable" and "incomprehensible." In 1705, contemporary historian Robert Beverley wrote:

"In the spring of the year, herrings come up in such abundance. . . to spawn, that it is almost impossible to ride through, without treading on them."

A fishery to exploit the abundance of these fish developed slowly due to a lack of the colonists' fishing expertise. So poor were their abilities that during the early 1600s, Indians were granted residence within settlements on the condition that they engage in fishing for the benefit of the community.

By the middle of the 18th century, haul seines greatly increased the harvest of shad and river herring (alewife and blueback herring) from Virginia's coastal waters. George Washington was one of many plantation owners who reaped annual profits from the shad fishing industry. A

single day of seining at Mount Vernon during April of 1777 collected one-half million fish.

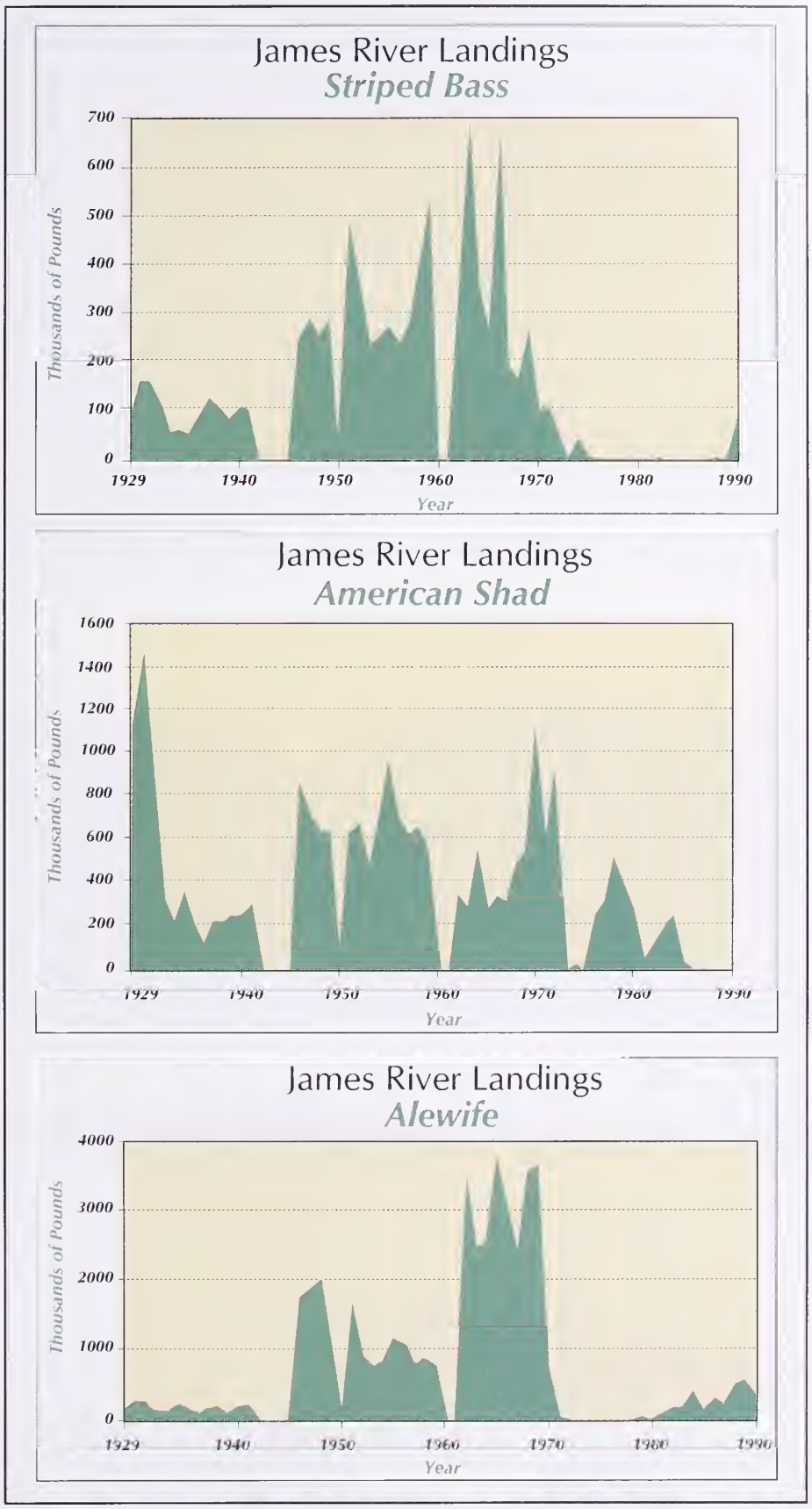
Throughout the 1800s, the harvest of shad in Virginia waters increased dramatically, peaking at the beginning of the 1900s with annual catches of up to 8 million pounds. In the years that followed, however, the harvest of American shad dwindled, reaching a low of 450,000 pounds in 1990. American shad harvest from the James River regularly exceeded one-half million pounds through the early 1970s but declined to 4,000 pounds by 1987. Less than 500 pounds per year have been reported in recent years.

Not only does this represent the loss of a commercial fishery, once the most valuable in Virginia, but it also means the loss of an important recreational fishery.

Other commercially valuable anadromous fishes (those that migrate from marine to freshwater to spawn), including hickory shad, alewife, blueback herring, Atlantic sturgeon, and striped bass, experienced similar declines. With the exception of striped bass, which are strictly regulated, the current abundance levels of anadromous species are at an all-time low.

Virginia's largest river begins the slow and costly road to recovery.

In addition to their economic worth, these migratory species once played a significant ecological role in coastal tributary ecosystems. Many shad and river herring die shortly after spawning and the decomposing carcasses may have once represented an important source of nutrients to tidal freshwaters and enhanced the productivity of these streams and rivers. Also, because shad and river herring remain in freshwater through the autumn of their first year before returning as adults to the ocean, they provided abundant forage for larger predatory species.



These graphs illustrate the dramatic decline in the stocks of striped bass, American shad, and alewife (herring) in the Chesapeake Bay, and particularly in the James River. Data courtesy of the Virginia Marine Resources Commission. Graphics by Pels.

Over-fishing, pollution, and the loss of historic spawning grounds have all contributed to the declines in migratory fish. As early as 1771, the potential impact of dams on migratory fish abundance was recognized, resulting in a Virginia law that required dam operators to provide fish passage between the months of February and May, with a fine payable in tobacco for non-compliance. These early structures were ineffective, however, and did little to facilitate fish passage.

The first major James River dams were built after 1790. These and subsequent dams at Richmond and Lynchburg excluded migratory species from spawning and rearing habitat within the James River and its tributaries.

Reversing this trend and restoring these fish back to their historical abundance will require restocking above blockages, constructing passage facilities, improving degraded upstream habitat, and regulating the harvest of adult fish. A long-term management and research effort will be necessary if the James River is to join a growing number of large Eastern rivers, including the Delaware and Connecticut, now reaping the benefits of shad restoration programs. The following plan sets the framework for those needed efforts.

The Setting

Anadromous fish need clean, fresh water to spawn in, and miles and miles of it to thrive. They make their annual runs up into our rivers from the Atlantic Ocean every spring to find good spawning habitat.

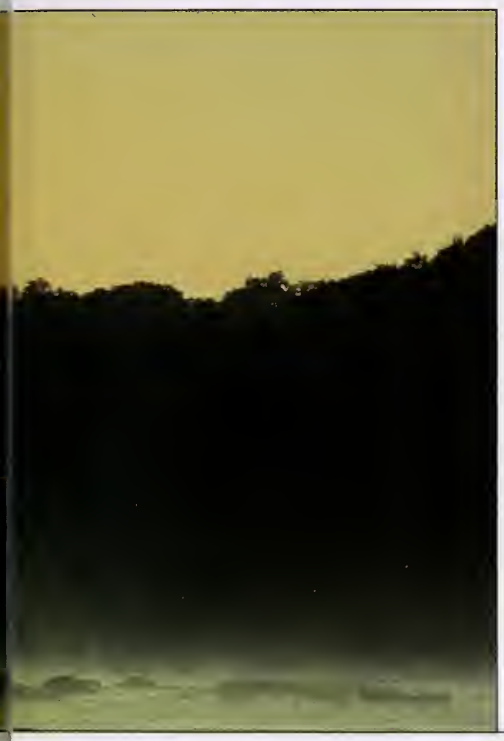
The James River is the largest tributary in Virginia and historically supported huge spring migrations of anadromous fish. Originating in West Virginia, it flows 450 miles before reaching the Chesapeake Bay. Along its course, the river drains 10,495 square miles of central Virginia, approximately one quarter of the state.

One encounters a variety of habitats throughout the length of the James River. The upper reaches provide coldwater riffles and pools that are excellent trout habitat. The broader sections of the middle James offer valuable habitat for smallmouth bass. The river reaches its fall line at Richmond, where it drops 105 feet in elevation over a seven-mile distance and becomes a tidal river influenced by the Chesapeake Bay.turns. Here the river becomes wider and slower flowing.

Striped bass numbers have declined precipitously in the James River due to overfishing and loss of spawning and rearing habitat. Recovery rests on reopening habitat, regulating the fishery, and improving the water quality throughout the river; photo by Rob Simpson.

Nearly two million people live in the James River watershed, representing one third of the entire population of the state. By the year 2000, this number is projected to increase by 14% to 2.3 million people. Due to increasing population and development, keeping the river clean and healthy for humans, fish and wildlife alike will be increasingly difficult.

The James River receives the high-



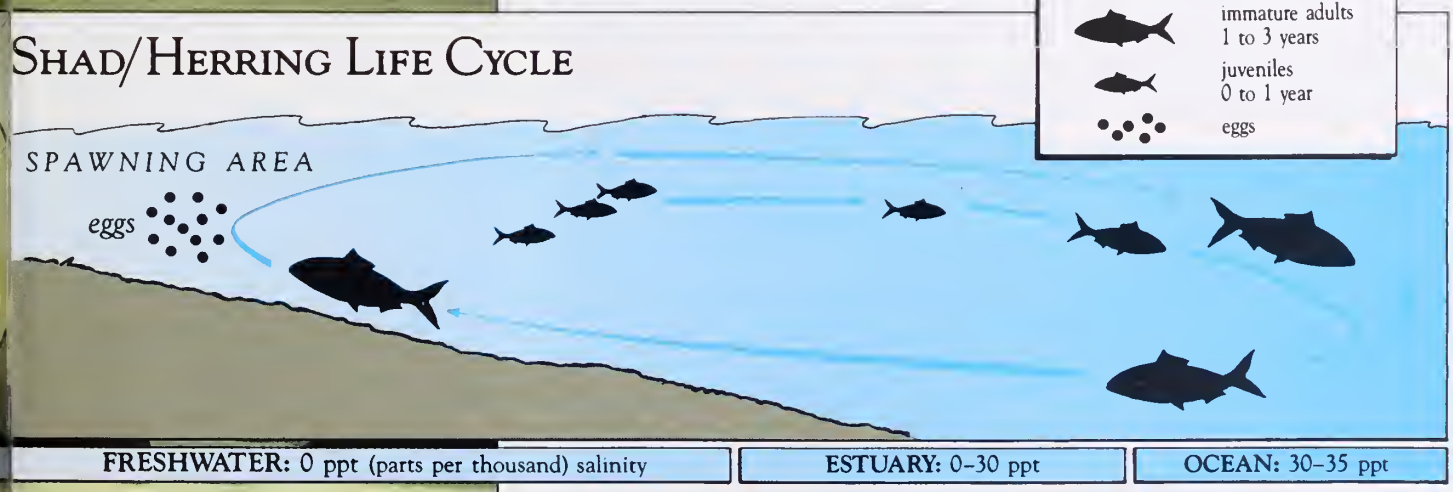


Illustration courtesy of the U. S. Fish and Wildlife Service. Photo by Michael McCormack.

The Problem:

The once plentiful stocks of migrating fish in the James River have dwindled to mere remnants of their historic levels.

Causes:

Overfishing, construction of dams, pollution, and habitat destruction all have combined to damage the populations of many migratory fish.

Goal:

To restore migratory fish populations to historic levels.

Solutions:

Through careful but active management, the major causes of fish population loss are being corrected: dams are being breached and fishways constructed; fish are being reintroduced to historic spawning and rearing areas; fishing regulations are being revised, and impaired habitat restored.

est nutrient loadings of any Virginia river. Sewage treatment plants, industrial discharges, agriculture, and urban runoff are the main sources of nutrients. High rainfall events cause overflows from Richmond's combined sewers. Improper land management also brings large quantities of sediment into the river during storms. Toxic pollution from industrial and urban activities poses additional dangers to the quality of the lower James River.

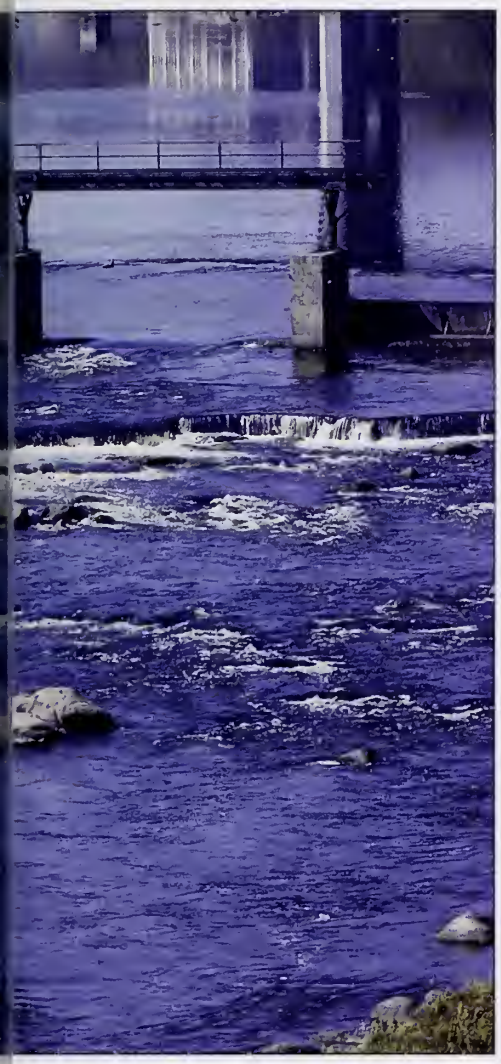
With only two exceptions, water quality in the river above the City of Richmond is considered to be in good to excellent condition. Pollution problems still persist in the Lynchburg area (high bacterial counts in the summer), and below the Westvaco plant in Covington low dissolved oxygen problems occasionally occur during the summer.

The problems with industrial and municipal outflows in the tidal freshwater areas of the James below Richmond are beginning to be addressed. Water quality conditions in the river below Richmond should show steady improvements in the future as industry and municipalities begin to upgrade their discharges into the James.

Virginia is a signatory to the 1987 Chesapeake Bay Agreement and is committed to the protection and restoration of the Chesapeake Bay and its tributaries. Significant work has been done to improve the water quality of the James River, and funds have been appropriated to maintain those improvements. Nonetheless, the future health of the James River is dependent upon the continued efforts by state and local governments and the support of private citizens.

Barriers

Two hundred and twenty-seven miles of the mainstem James River are blocked by dams. This represents nearly 13,000 acres of historic habitat, not including tributaries. Based on an average river flow, fishery biologists estimate that this lost habitat will support migratory runs of about 1.2 million American shad and 13 million river herring. These numbers, then, are our targets for restoration. Other species benefitting from restored habitat throughout the river will include hickory shad, Atlantic sturgeon, white and yellow perch, and American eel. Resident species such as largemouth, smallmouth, and crappie should benefit from increased feeding opportunities on the eggs, larvae, and juveniles of migra-



tory fish. Local food webs may also be enriched by nutrients from decaying post-spawn shad and river herring.

In general, three options are available for providing fish passage around dams. If a dam no longer serves a useful purpose, it may be breached to allow fish movements. Alternatively, fish ladders or lifts may be installed. A fish ladder is a passive device which provides a flow of water down a chute through which fish are able to swim up and over the dam. A lift is a facility in which the migrating fish are directed into a large submerged hopper that is elevated, or lifted, to the crest of the dam where the fish are released into the impoundment behind the dam. Although fish lifts can be expensive to build and maintain, they are often the most effective approach for large dams.

Restocking:

The purpose of a restocking program is to strengthen the naturally occurring spawning populations in targeted streams and rivers. Two promising approaches are the stocking of hatchery-reared American shad and the "trap and transport" of adult river herring.

Successful efforts to stock hatchery-reared American shad in the Susquehanna River and upper Chesapeake Bay suggest this approach should work for the James. The Virginia Department of Game and Inland Fisheries (VDGIF) plans to stock several million shad fry in the upper James River in 1992, and expects to operate a pilot hatchery program to gain experience and plan future restoration needs. If the hatchery project is successful, a large-scale hatchery program for American shad may be proposed. This effort will require both adequate funding and a reliable source of James River shad eggs.

"Trap and transport" has proven highly successful in restoring runs of river herring to New England streams and has recently been employed in Maryland. Pre-spawning adult river herring are trapped from healthy runs within the Chesapeake Bay watershed and transported to tributaries targeted for restoration of historic runs. The young river herring spawned from these adults return to these same streams to spawn after they reach sexual maturity in three to four years. This approach is particularly useful in reestablishing river herring runs in tributaries where fishways are being built. Trap and transport will be applied to selected tributaries within the James River.

Monitoring for anadromous fish will be a key element of the James River restocking program. A cooperative effort to monitor ichthyoplankton (fish eggs and larvae), juveniles and adults will help evaluate the success of the restocking efforts.

Management:

Successful restoration and maintenance of stable populations of migratory fish will not take place without sound management of fisheries on existing stocks. Most of the target species in this plan migrate through

Above left: *Canoeists as well as migratory fish can successfully navigate the recent breaches made in the Manchester and Browns Island Dams; photo by Mel White.*
Above: *Bathers enjoy a day on the James River in Richmond. Efforts are being made to further improve water quality there to benefit both people and fisheries; photo by Sarah White.*

the waters of several states and are subject to fishing pressure in those waters. Virginia must work closely with all involved states to achieve effective management. The Atlantic States Marine Fisheries Commission (ASMFC) provides the best forum for multi-state management. It is essential that the Virginia Marine Resources Commission (VMRC), as Virginia's representative agency at the ASMFC, take a lead role in both the development and implementation of strong fishery management plans for each of the target species in this plan.

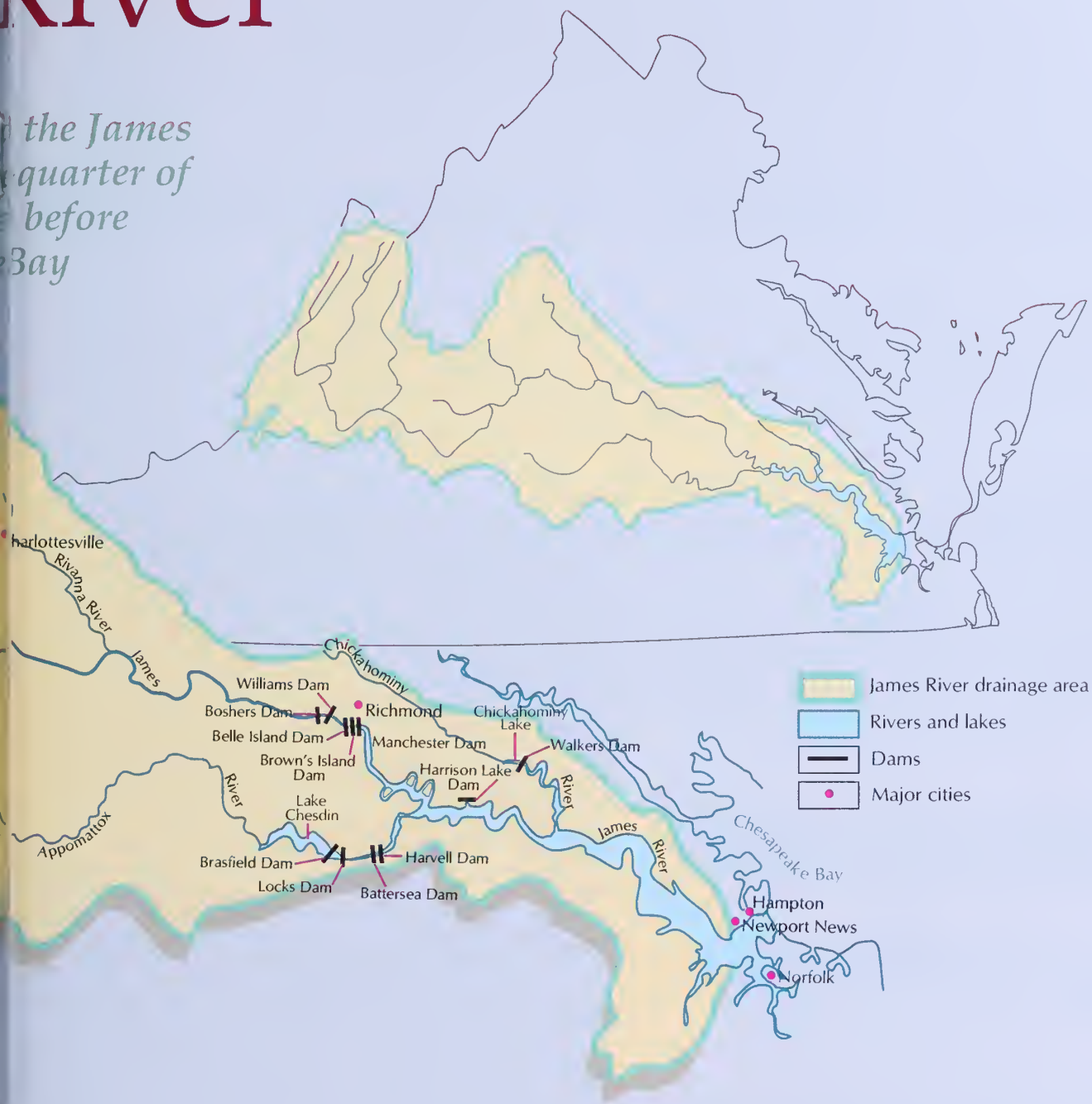
The highest priority for management should be the conservation of sufficient adult stocks to bring about the recovery of all depleted populations. The adoption of this goal together with uniform compliance with the ASMFC Plan has brought about partial recovery of striped bass stocks in Chesapeake Bay. For other species, most prominently the American shad, this approach has not been consistently adopted. Although traditional inshore fisheries for shad have declined in recent years, coastal "intercept" fisheries which harvest shad stocks as they prepare for their spawning runs have expanded. Significant numbers of James River shad are caught in the combined river and ocean fisheries. VMRC should take the steps necessary to ensure that the restoration efforts are not compromised by overfishing of James River shad. Expensive fish passage and restocking programs will only succeed if they are accompanied by effective fisheries management.

The James

The largest tributary in Virgi River drains approximately c the state and flows 450 m reaching the Chesapea

River

the James
quarter of
before
Bay

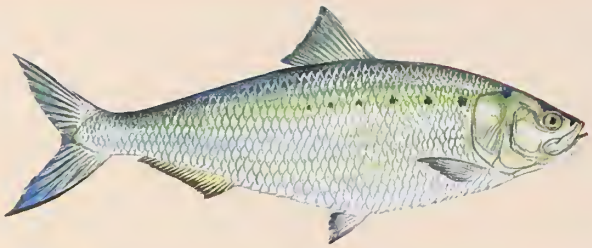


Even in the heart of Richmond, fishing should improve as more of the James River is made accessible to migratory fish; photo by Lee Walker. Map graphics by Pels.

Target Fish Species

Restoration and passage efforts should prove most beneficial to shad, herring, and striped bass.

American shad
(Alosa sapidissima)



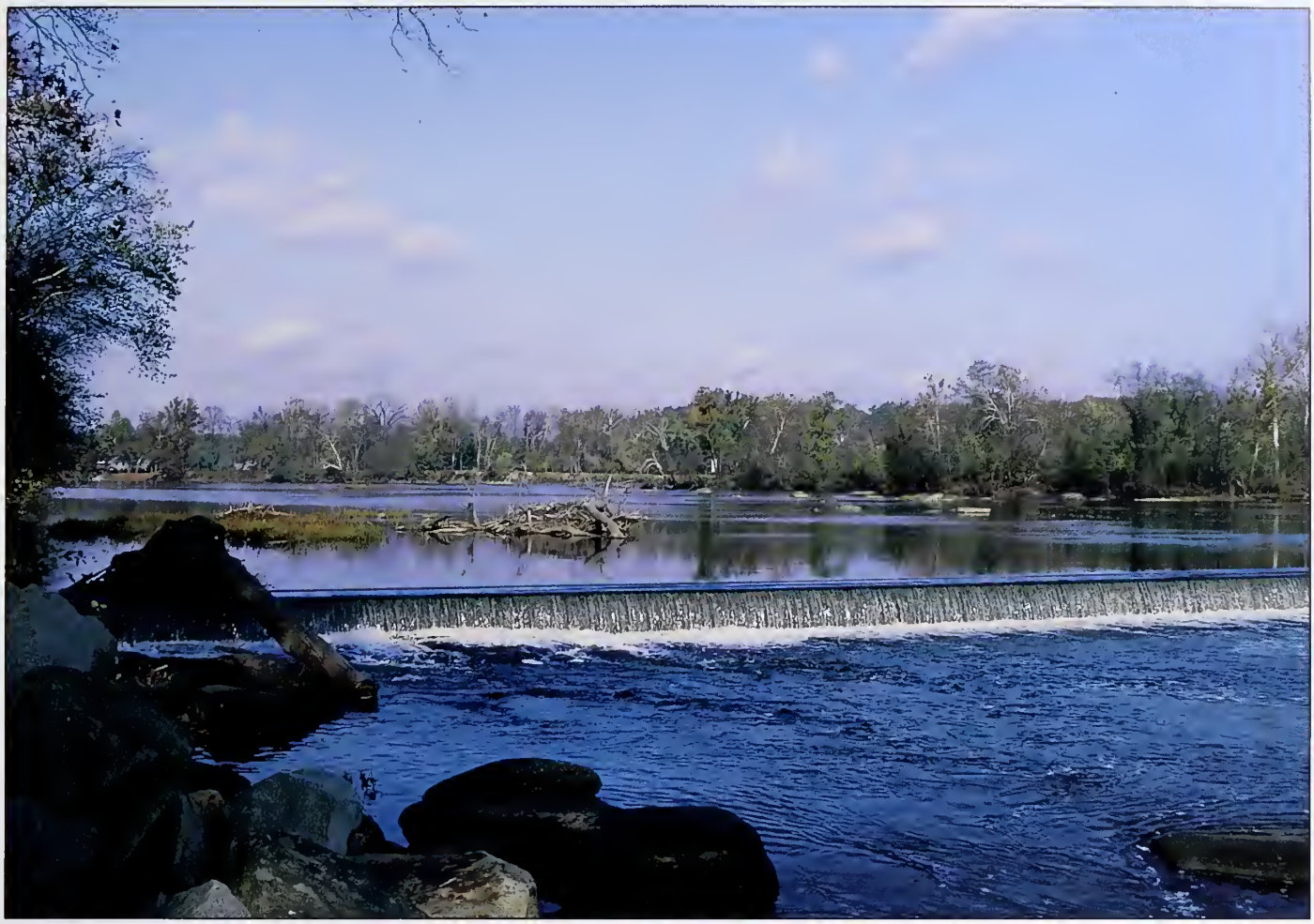
striped bass
(Morone saxatilis)

hickory shad
(A. mediocris)

blueblack herring
(A. aestivalis)

alewife
(A. pseudoharengus)

Photo by Michael McCormack. Striped bass illustration by Michael Simon. All other illustrations by Duane Raver, Jr.



A 30-foot notch will be constructed in the near future to facilitate fish passage at Williams Island Dam; photo by Sarah White.

The Lower James River Dams:

Profiles

Many man-made structures impede fish migrations throughout the James River and on many of its tributaries. Due to the immense scope of restoration needs, only those impediments on the lower James and several of its tributaries are profiled below.

Mainstem James River

Manchester/Browns Island Dams:

Height of dams: 1 - 9′
River miles opened: 6

Manchester Dam is the oldest of five dams within the fall line reach of the James River. Located within the heart of Richmond, this dam was constructed in 1803 and had a useful history as a provider of hydropower and water supply. The Browns Island Dam is just upriver of the Manchester Dam. Built in 1901, this old dam was used to divert water to a hydropower station.

Both dams lie abandoned. To facilitate fish passage, both dams were breached in January 1989. A 124-foot hole was blasted in Manchester Dam, and three spillway sections on Browns Island Dam were breached. The total cost for this project was $179,000. Virginia Commonwealth University has monitored the success of these breaches for several years under the direction of Dr. Greg Garman. American shad and striped bass are now successfully migrating through these dams and are reaching Williams Island Dam, six miles upriver.

Hollywood/Belle Island Dam:

Height of dam: 4 - 16′
River miles opened: 5

Located one mile upriver from Browns Island Dam, this dam was constructed in 1830 and has provided a water supply for the City of Richmond as well as water for power generation. Now abandoned, this dam has two breaches used by migrating fish that have successfully traversed the Hollywood rapids. There are no plans to further modify this dam to improve fish passage .

Williams Island Dam:

Height of dam: 3 - 7′
River miles blocked: 2.6

The fourth in the series of dams in Richmond, this 87-year-old dam actually consists of two dams separated by Williams Island. Originally supplying water to the James River Canal, this dam now impounds the City of Richmond's potable water supply. Williams Island Dam has the well-deserved reputation as one of the most dangerous man-made impediments on the James River. Fifteen people have perished in the last 45 years because of the dangerous turbulence created at the base of the dam during medium river flows. In its present state this dam is neither conducive to recreational use, nor to fish passage.

In 1991 the City of Richmond approved the concept of a 30-foot notch in the south channel dam, which will allow shad, striped bass, and river herring to migrate past the dam. This will provide an additional 2.6 miles of river for spawning and also provide safe passage for recreational users at a cost of approximately $125,000.

Boshers Dam:

Height of dam: 10′
River miles blocked: 140

At the extreme upper end of the fall line, this 10-foot dam is owned by the C&O

*Boshers Dam **(above)** is the last major hurdle for migrating fish in the Richmond area; photos this page by Mel White.*
***Opposite page:** This double Denil fish ladder constructed in 1989 at Walkers Dam has successfully passed migrating herring into the Chickahominy Reservoir; photo by Lee Walker.*

Railroad but the City of Richmond owns both the water rights and head gates. This is the last but the most effective blockage to migration at the fall line. American shad and striped bass presently reach the base of the dam during high river flows.

Construction of fish passage facilities will become imperative at Boshers Dam when the notch is completed at Williams Island Dam. Either a fish ladder or a fish lift will be constructed at Boshers. When completed, the passage facility at Boshers would allow anadromous fish to swim 140 miles upriver to the next series of dams at the City of Lynchburg.

Lower James Tributaries:

Walkers Dam:

Height of dam: 3 - 4′ exposed at low tide
River miles opened: 30

Located on the Chickahominy River this Denil-style fish ladder on Walkers Dam was completed in August 1989 at a cost of $45,504 and allows fish passage into the Chickahominy Reservoir and its tributaries. This fishway has proven the most successful of any in Virginia to date, passing striped bass, river herring and American shad into the 1500-acre reservoir. Fish have migrated six miles above the reservoir and 10 miles above Walkers Dam.

Harrison Lake Dam:

Height of dam: 10′
River miles opened: 82-acre reservoir

This Denil-style fish ladder was completed in January 1989 by the United States Fish and Wildlife Service (USFWS) at a cost of $90,000. This fishway was designed for river herring migrating up Herring Creek, but it has only passed several dozen fish annually. In 1991 beaver dams and debris were removed from the creek below the dam to allow river herring access to the dam and fishway. However, low numbers of river herring in the creek within the last several years may also be the reason for lack of use. As river herring stocks rebound to their historical numbers within the creek, crowding should create the impetus to push the river herring through the fishway and into 82-acre Harrison Lake. Further migration into the tributaries of the lake is not expected.

Harvel Dam:

Height of dam: 7 - 9′
River miles blocked: 0.5

Eleven miles upriver of the confluence with the James River, this Virginia Power dam on the Appomattox River was taken out of service in 1965. Now in private ownership and under a new Federal Energy Regulatory Commission (FERC) license for power generation, this dam must have a fishway constructed to meet requirements of Section 18 of the Power Act. A conceptual fishway design has been approved by the USFWS, and construction should

The James River in Richmond; photo by Dwight Dyke.

begin in the near future. The deadline for project completion is February 28, 1994.

Battersea Dam:

Height of dam: 3 - 4′
River miles blocked: 5.1
Battersea Dam is the next impediment upriver of Harvel Dam. Under private ownership, this FERC licensed hydropower project is a possible impediment to fish passage. A breach already exists near the south shore, but migrating fish reaching this dam may not pass through this natural break, and a fishway will have to be constructed.

Locks Dam:

Height of dam: 5 - 12′
River miles blocked: 1.4

Just upriver from Battersea Dam, this old Virginia Power dam is now owned by the City of Petersburg. Locks Dam is in two sections divided by Sycamore Island. Its northern section has an old, non-functional fishway. The dam is being considered as a possible site for hydropower generation and a new fish passage facility would be required if a FERC license is issued.

Brasfield Dam:

Height of dam: 55′
River miles blocked: 118

This last man-made impediment on the Appomattox River, Brasfield Dam would require a fish lift for successful passage of shad and river herring. This dam is also being considered for hydropower generation. A FERC license has been issued and hydropower and fish lift facilities will be constructed.The lift, or elevator, has been designed by consultants for the Appomattox River Water Authority, owners and operators of the dam. Having passed the dam, migrating fish will have access to spawning and rearing habitat within 3100-acre Chesdin Reservoir and an additional 103 miles of the Appomattox River. River herring could eventually migrate as far as Appomattox County, upriver of the Town of Farmville.

Without a substantial commitment of funds and mutual participation, migratory fish stocks in the James will continue to be jeopardized; photo by Michael McCormack.

Sharing The Costs

Reopening and restoring habitat is expensive. Multiple sources of financial and technical support will be required to complete fish passage and habitat restoration on the James River. These sources must include state and federal agencies as well as local municipalities and private resources.

In 1989, the General Assembly established a Virginia Fish Passage Grant and Revolving Loan Fund. The fund provides 75 percent cost-share grants for local governments and low-interest loans for private individuals and organizations. This revolving fund supported the monitoring of the breaches at Manchester and Browns Island Dams and may help finance the notch proposed for Williams Island Dam. However, a substantial commitment to the Commonwealth's revolving fund will be required to help finance fish passage.

Direct funding has also been provided by VDGIF for the Manchester and Browns Island breaches, and by the USFWS for the Harrison Lake fishway.The USFWS also has provided invaluable technical advice and design criteria for special fish passage projects throughout Virginia. The Newport News Water Department funded the design and construction of the Walkers Dam fish ladders, and the Appomattox Water Authority will finance the fish lift at Brasfield Dam at Chesdin Reservoir.

The high cost of providing design plans, construction, and monitoring of fish passage facilities dictates that the financial requirements must often be shared. Without mutual participation the job will not be completed and the migratory fish stocks in the James River will continue to be jeopardized.

Meeting the Challenge

The 1987 Chesapeake Bay Agreement included a commitment to "provide for fish passage at dams, and remove stream blockages whenever necessary to restore natural passage for migratory fish." Virginia, as a co-signer of that agreement, is committed to that goal.

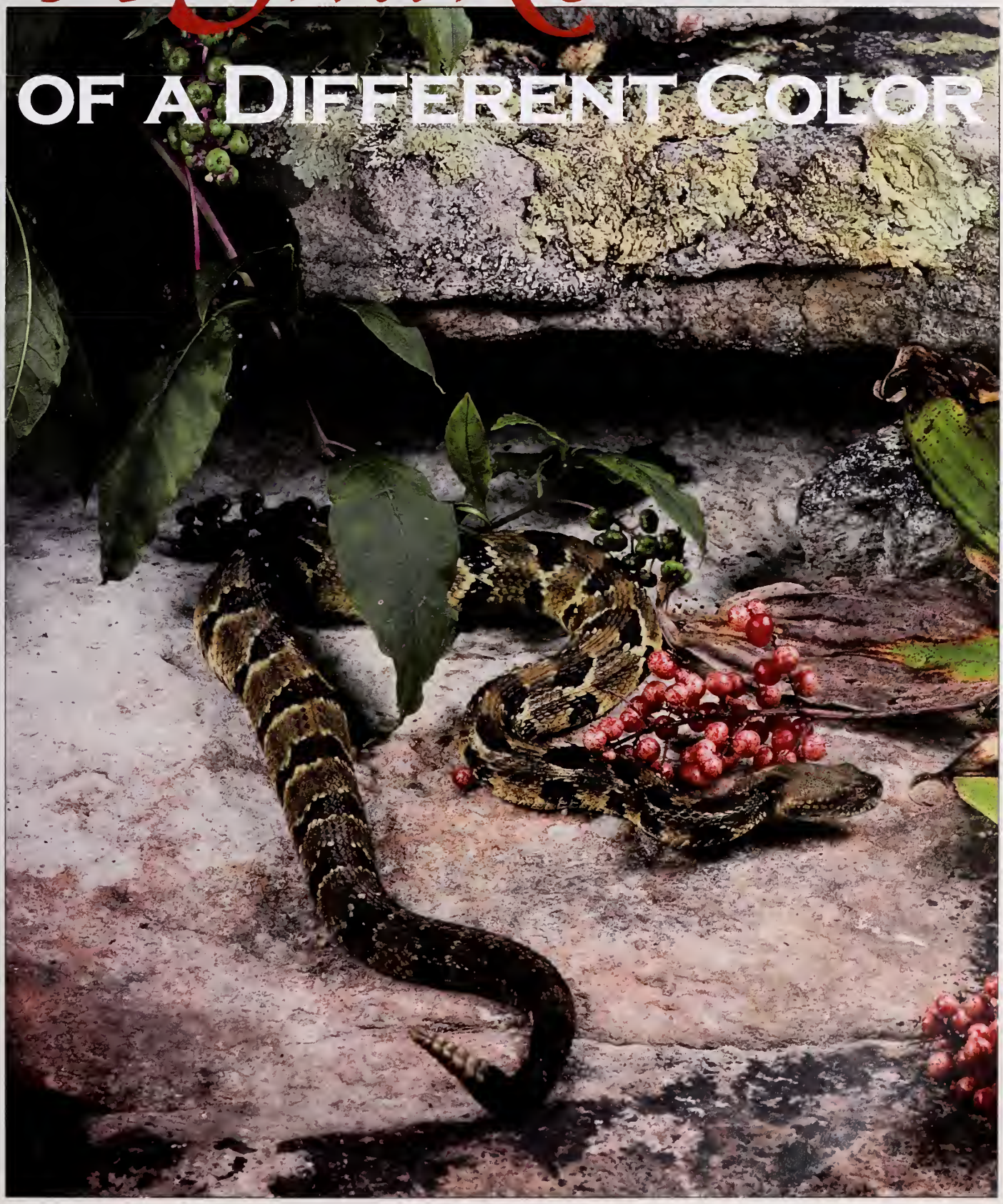
The story of fish passage on the James River does not end with the lower James. Major needs for funding, improvements in water quality, fish habitat, and new fishways at dams in the vicinity of Lynchburg and Charlottesville will be challenges in the future.

Restoring migratory fish stocks to the James River and its tributaries will continue to require major efforts by state, federal and municipal governments as well as private individuals and corporations. These efforts will need to be multi-faceted, involving basic research, wise use of finite resources, sound fisheries management, and public education.

The final chapter in this overall commitment will reveal how the efforts of knowledgeable and caring people returned the James River to its former position as major spawning habitat for striped bass, shad, and river herring. This chapter will also document the restoration of the James as a key part of the return of the Chesapeake Bay to one of the most productive estuaries in the world. □

Cooperatively produced by:
Virginia Department of Game and Inland Fisheries
Chesapeake Bay Foundation
U.S. Fish and Wildlife Service
Virginia Commonwealth University
Virginia Institute of Marine Science
Virginia Marine Resources Commission

A Snake of a Different Color



"Yellow phase" of a timber rattlesnake; photo by Rob & Melissa Simpson.

Timber rattlesnakes: Above left: *"Dark phase" and "yellow phase" timber rattlesnakes; photo by R. N. Bader.*
Above: *Intermediate phase of timber rattlesnake; photo by Rob & Melissa Simpson.*
Cottonmouths: Below: *Cottonmouths are known to vary in color, with some in the same population being distinctly darker than others; photos by R.W. VanDevender.*

You might think you know what a cottonmouth or a copperhead snake looks like, but snakes of the same species often differ in color and pattern. Read on to find out why!

by Joseph C. Mitchell

Snakes are some of the most fascinating animals. Not only do they survive well in nature without legs or ears, but they exhibit a wide variety of colors and patterns. These traits make them attractive to many people. Indeed, keeping snakes as "pets" is commonplace in this and other countries. Although not everyone keeps snakes as pets or studies them in captivity, most of us are interested in being able to identify at least the venomous species from the nonvenomous species. But, color and pattern variations in snakes can cause some practical problems with identification.

A basic understanding of variation in their colors and patterns is fundamental to learning how to tell which species is which. A frequent comment I hear is that the snake someone has seen in nature cannot be the same species as the one illustrated in a photograph or drawing, because they do not look the same. The problem is that one illustration of a species in a field guide cannot begin to demonstrate the differences among individuals.

Like other animals, snakes possess a trait unique to living species—variation. This is not the case with non-living things like minerals where each type (also sometimes called a species) is identical to all others in structure, color, and texture. The same goes for certain parts of atoms in the world of physics. A very important characteristic of living species, however, is that there is no one single norm for all individuals. Each is slightly different from all the others in a variety of ways. We humans are so trained to look for the average that we have almost fogotten to look for the variation. But, in living species, the variation in color, pattern, body form, etc. is the true natural characteristic.

Snakes exhibit a wide range of color and pattern variation across Virginia. For example, snakes in the same population exhibit variation due to the fact that each individual has inherited a slightly different set of genes. In this type of *population variation*, some will be colored differently than others, some will have slight differences in pattern, and

Copperheads: *Copperheads vary in color according to geography in Virginia. In the southeastern corner of the state, copperheads have brown to dark tan crossbands on a light tan to pinkish body (**top**; photo by Joseph Mitchell). In the mountains, the snake's crossbands are dark brown to a deep chestnut on a brown to grayish body (**above**; photo by Joseph Mitchell). And in the piedmont, the bands are dark brown to chestnut on a reddish brown to grayish-brown background (**right**; photo by Rob Simpson).*

some may even have dramatically different patterns, called aberrations.

A more specific type of population variation is called *polymorphism*, which refers to the existence of two different and distinctive color or pattern types in the same population in the same area. This particular form of variation is comparatively rare, however, and occurs in only one species in the Commonwealth.

Snakes also exhibit *geographic variation*. In one area of the state, snakes of a given species have a characteristic range of colors and patterns, while in another their colors and patterns may be entirely different.

Finally, take a look at the juveniles and adults of a species. You'll find that in many cases each has its own distinct patterns and colors, something known as *ontogenetic variation*.

All snakes exhibit these patterns of variation. A good example of population variation occurs in the cottonmouth (*Agkistrodon piscivorus*) populations found in the southeastern corner of Virginia. The pattern of crossbands on some individuals will be distinct and associated with varying amounts of yellow pigment on the body. Others, especially the older ones, will be considerably darker and the crossbands completely obscured by large amounts of dark pigment. I have seen several Virginia cottonmouths that were almost entirely black.

Timber rattlesnakes (*Crotalus horridus*) also display considerable variation in color and pattern within the same population. Completely black "dark phase" individuals without pattern can be found in close association with "yellow phase" individuals which possess a vividly distinct series of black chevrons on a yellow to yellowish-brown body. These variations occupy the ends of a spectrum, as there are also individuals in the population that possess colors intermediate between these two extremes.

The only venomous snake found throughout Virginia, the copperhead (*Agkistrodon contortrix*), offers a good example of geographic variation. Its pattern of hourglass-shaped crossbands is a basic characteristic, but its colors differ substantially across the Commonwealth. In the southeastern corner of the state, copperheads have brown to dark tan crossbands on a light tan to pinkish body. The head is a reddish tan. In the piedmont, the bands are dark brown to chestnut in color on a reddish-brown to grayish brown background. The heads of these copperheads are often a reddish brown, similar to the color of piedmont clay. In the mountains of Virginia, the copperhead's crossbands are dark brown to a deep chestnut on a brown to grayish-brown body. Some individuals contain a large amount of black flecking, making both the crossbands and the body color very dark.

Ringnecked snakes (*Diadophis punctatus*) are dark brown to dark gray and lack a pattern altogether, except for a yellow collar on the neck and a series of black markings on the belly that may or not be present. In snakes from the southeastern corner, the collar is broken in the middle and the belly markings consist of a single series of black half moons. Elsewhere in Virginia, the collar is unbroken, and the belly either lacks markings altogether or consists of small black dots that do not occur on every scale.

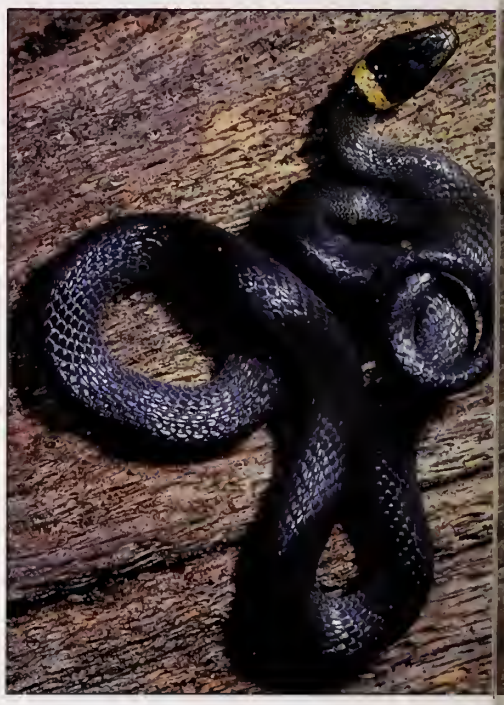
Each of these variations is recognized by the scientific community as a race, or subspecies. The southern ringnecked snake (*Diadophis punctatus punctatus*) occurs in southeastern Virginia, and the northern ringnecked snake (*Diadophis punctatus edwardsii*) occurs in the rest of the state. A zone extending northeastward from about Brunswick and Greensville counties contains populations in which both

variations exist. Some individuals in these populations possess combinations of both variations. This reflects that fact that these are races of the same species whose members freely interbreed. It also demonstrates that the genes for broken collar and black half moons on the belly are found only in the southeastern corner of the Commonwealth.

The most dramatic example of geographic variation found in Virginia snakes occurs in the milk snake (*Lampropeltis triangulum*). In mountain populations these snakes are brown to gray, variously peppered in black, with a series of brown to reddish-brown blotches. Each blotch is slightly wider than long and surrounded by black. The blotch on the head is elongated, Y-shaped, and bordered in black. In the southeastern corner, milk snakes are brightly colored with a series of red crossbands separated from yellow bands by black bands. The head is red and separated from the yellow crossband on the neck by a black crossband. This arrangement of band colors is sometimes referred to, especially in the deep South where coral snakes occur, as "red touch black, friend of Jack." The opposite arrangement of "red touch yellow" is the coral snake pattern. Coral snakes do not occur in Virginia, so we do not have to worry about which colors border the red bands.

Although rarely encountered because of the loss of habitat and killing since Colonial times, milk snakes from the Virginia piedmont are intermediate in color and pattern. Most are reddish-brown and have large blotches draping across the back, but lack the Y-shaped blotch on the head. This latter variation extends into the northern section of the Blue Ridge Mountains and occasionally can be found in Shenandoah National Park. The southeastern form is sometimes called the scarlet king snake, but true scarlet king snakes (*Lampropeltis triangulum elapsoides*, a race of the milk snake), in which the bands completely encircle the body, are found south of Pamlico Sound. The bands on the snakes in southeastern Virginia do not meet in the middle of the belly, indicating an intermediate character state.

Another characteristic of some, but not all, snakes is that juveniles possess different patterns and colors than their parents. Ontogenetic variation is found in nine of the 30 species of snakes found in Virginia. A prime example is the black rat snake (*Elaphe obsoleta*). The babies that hatch from eggs in late summer have a series of black to dark brown blotches on a dull white to gray body that is variously peppered with black specks. There is also a distinct brown stripe that runs from the snout to the rear corner of the mouth and a brown band across the top of the head. As

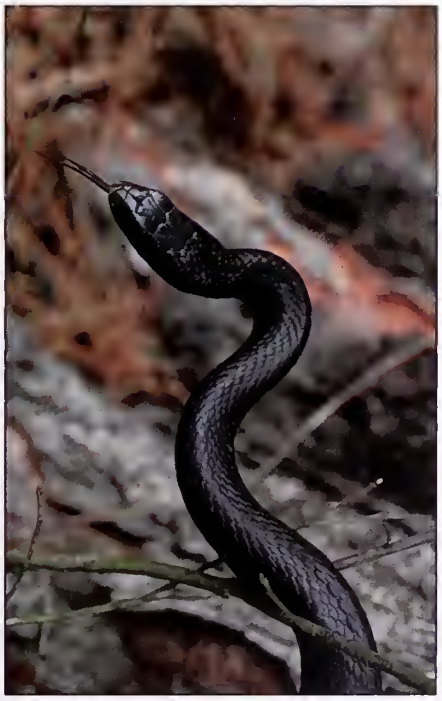


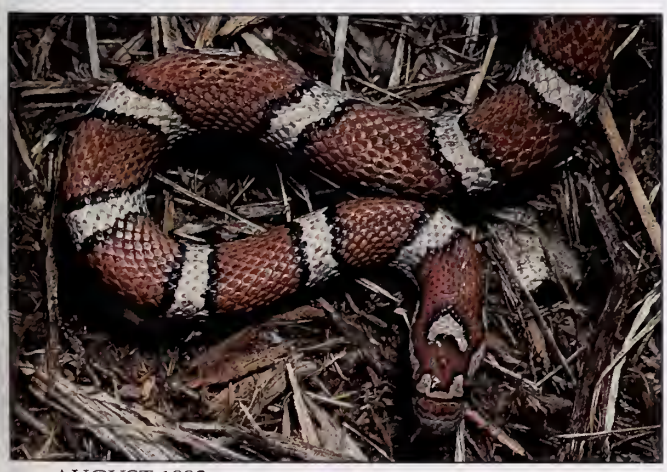
Ringnecked snakes: *Ringnecked snakes in the southeastern corner of the state have a yellow collar broken in the middle and black half moon markings on their bellies (**above right**; photo by R.W. VanDevender), while elsewhere in Virginia the collar is unbroken and the belly either exhibits black dots or lacks markings altogether (**right**; photo by Rob Simpson).*
Milk snakes: *The most dramatic example of geographic variation found in Virginia occurs in the milk snake. In the southeastern corner, milk snakes are brightly colored with a series of red, black and yellow crossbands (**below left**; photo by Joseph Mitchell). In the mountains, these snakes are brown to gray, variously peppered in black with a series of brown to reddish-brown blotches (**below right**; photo by Rob Simpson). Finally, milk snakes in the piedmont are intermediate in color and pattern (**opposite, below right**; photo by Rob Simpson).*

the snake grows, its skin accumulates more black pigment. By one year of age, the snake has so much black that its juvenile pattern is almost obscured. By age two most black rat snakes look like their parents. I should point out, however, that the pattern can still be seen on some large individuals, especially when they expand their bodies, such as after ingestion of a large meal. The skin expands, the scales separate, and an outline of the blotched pattern is revealed. In some adults from southwestern Virginia, the blotched pattern is faintly visible at all times. Black racers (*Coluber constrictor*) exhibit the same form of ontogenetic variation, with juveniles having a blotched pattern that changes to all black adults.

Copperheads and cottonmouths also exhibit ontogenetic variation. At birth through the first year, juveniles possess a bright yellow tail tip. It is sometimes used as a lure to attract an insect, lizard, or frog that becomes the snake's meal. The lure fades with age, first turning greenish, and then brown.

The only species of snake in Virginia that exhibits polymorphism is the hognosed snake (*Heterodon platirhinos*). Adults in the same population exhibit two distinctive colors and patterns. One is the patterned phase, with a series of irregular black to dark brown blotches down the back alternating with black spots on the sides. The body color consists of various combinations of gray, tan, pink, yellow, orange, and red. The other phase is characterized by all black coloration without a pattern. Both possess the stout body form with upturned snout and both display the hissing, head spreading, and playing dead behaviors typical of this snake. The polymorphism does





Black rat snakes: *Juvenile black rat snakes have black to dark brown blotches on a light background (**above**; photo by David Liebman), while the adults are characteristically black, though sometimes showing an outline of the blotched pattern when their bodies are expanded (**top**; photo by Rob Simpson).*
Black racers: *As you can see, the adult black racer (**above right**; photo by David Liebman) also differs in color and pattern from the juveniles of the species (**right**; photo by Joseph Mitchell).*

Copperheads: *Compare the juvenile copperhead pictured here (**top**; photo by Joseph Mitchell) with the adults pictured on page 29. Young copperheads and cottonmouths have a yellow-tipped tail which is sometimes used as a lure to attract prey.*
Hognosed snakes: *Adult hognosed snakes in the same population exhibit two distinctive colors and patterns, the only snake in Virginia to do so. **Left** and **bottom right** are examples of different colors in the patterned phase (photos by Rob Simpson), while the patternless phase is illustrated **bottom left** (photo by Joseph Mitchell).*

not appear to be present at hatching, as no black, recently-hatched hognosed snakes have been found. All hatchlings I have seen possessed distinctive patterns. Apparently some individuals develop into the black, patternless phase later in life, although we do not know why this happens.

Montane populations of timber rattlesnakes are sometimes said to come in two phases, yellow and black. However, as described above, these are the extremes of a wide range of variation with everything in between. Hognosed snakes, on the other hand, are distinctive because they only possess the two phases.

Understanding variation is important, not only for identification purposes, but also for conservation of our native fauna. The four types of variation we've discussed here pertain to almost all other animals and even plants. Each species has a unique set of genes passed on from generation to generation over eons of time, and consequently, its own range of variation of colors and patterns. Some of the genes are found in one part of the range and not in others, like in the milk snake and ring-necked snake in Virginia.

We have learned that species with little variation in their genetic make-up are vulnerable to extinction. If we are to keep a species from going extinct, we need to ensure that all the variation in that species is maintained. This means that we cannot allow populations in one part of the range to go extinct, thinking it is acceptable because there are other populations in existence elsewhere. An understanding of variation at both the species and population levels goes hand in hand with an awareness of how we should conserve and manage our endangered and threatened species.

"Variation is the spice of life," as an old saying goes. Indeed, variation is the backbone of life, as species would not have been able to endure the environmental changes they have faced over thousands of generations without it. Thus, variation is important to the continued existence of these animals and it is important to those of us who care about them. □

Dr. Joseph Mitchell teaches conservation biology at the University of Richmond and studies Virginia's native wildlife.

1992 Virginia Big Game Contest

The 53rd annual Virginia Big Game Contest is coming up! On September 12 and 13, the Eastern Regional Contest will be held at James Blair Middle School, 117 Ironbound Road, Williamsburg. The entry deadline is 10:00 p.m. on September 12.

On September 25 and 26, the Western Regional and State Championship will be held at the Rockingham County Fairgrounds in Harrisonburg, located on U.S., 11, 1.6 miles south of exit 62 off I-81. The entry deadline is noon on September 26.

The Virginia Big Game Contest is Virginia's only official contest sponsored by the Virginia Department of Game and Inland Fisheries, the Virginia Peninsula Sportsmen's Association, and the Rockingham-Harrisonburg Chapter of the Izaak Walton League.

For more information about the Eastern Regional Contest, contact Carol T. Hall, President, Peninsula Sportsmen's Association, Inc., P.O. Box 1933, Newport News, VA 23601, or phone: 804/220-3711.

For more information about the Western Regional and State Championships, contact Boyd E. Skelton, Rockingham-Harrisonburg Chapter, Izaak Walton League, 412 N. Main Street, Bridgewater, VA 22812, or phone: 703/828-3393. □

Letters

Cats in Question

Joseph Mitchell's article in the June, 1992 issue of *Virginia Wildlife* on the destruction of wildlife by cats has been long overdue.

I have never allowed cats on my farm since I enjoy songbirds. This year purple finches are among the cardinals, phoebes and many other birds. Black rat snakes survive in numbers and control the populations of rodents.

Perhaps it is time to study how dogs affect wildlife. Even though dogs are less efficient hunters, packs of dogs must make up for their individual deficiencies. It does not seem sensible to allow hounds to harass and kill wildlife throughout the year. Legal spring hunt trials and running of dogs otherwise are bound to destroy some species. Some will claim otherwise, but it is impossible to assess the situation from the side of roads.

Patricia J. Hurst
Rapidan

Kudos

Please consider my three-year renewal a note of confidence in your hunting stance, as well as Harry Murray's fishing articles and the photographs. Keep it up.

J. Robert Brame, III
Richmond

One of the greatest Father's Day gifts money can buy!

J. L. Waters, Jr.
Moseley

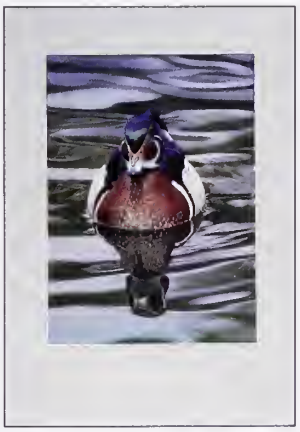
The May 1992 issue on birds is worth the total yearly subscription price. Thank you.

Bill Simpson
Riner

Dog Gone

A friend loaned me her copy of *Virginia Wildlife* and my dog enjoyed it so much, she ate it. I need to replace it because my friend keeps all her copies. Enclosed is my check for $1.00.

Suzanne Kilgo
Canton, GA



Virginia Wildlife Posters

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Supplies are limited, so specify which poster(s) you'd like us to send to you, make your check out to the Treasurer of Virginia (send $8 for each poster ordered), and mail your order to:
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Recipes

By Joan Cone

Eel For A Summer Dinner

Whether smoked or cooked in any other manner, eels are delicious and have a flavor somewhat like that of swordfish.

Found all over Virginia in fresh and saltwater, eels must be skinned. Using a sharp knife, cut the skin completely around the body just behind the head. Then take the head in one hand and use pliers in the other to work the skin off in a single piece. Afterwards, clean like any other fish and cut crosswise into chunks between one and two inches long.

MENU

Cold Cream Of Squash Soup
Eel In Skillet
Potato Salad
Peas Vinaigrette
Nectarine Pandowdy

Cold Cream of Squash Soup

2 cups sliced yellow squash
2 tablespoons margarine or butter
4 cups chicken broth
1/4 teaspoon onion powder
1/2 teaspoon salt
3 to 4 drops hot pepper sauce
1 carton (8 ounces) commercial sour cream

Combine squash, margarine and 1/2 cup chicken broth in a medium saucepan. Cover and cook for 10 minutes or until squash is tender. Pour squash mixture into container of an electric blender or processor. Add remaining chicken broth, onion powder, salt and hot pepper sauce; blend until smooth. Pour into a large bowl; cover and chill several hours. Stir in sour cream just before serving. Makes about 5-1/2 cups.

Eel in Skillet

1 pound eel, dressed, skinned and cut into 1 to 2-inch pieces
2 tablespoons butter or margarine
1 can (12 ounces) beer or chicken broth
Herbs: thyme, sage or tarragon

In a heavy skillet or electric frypan, lightly brown eel pieces in butter. Add beer or broth, cover and cook for 10 minutes. Then add a pinch of one or more herbs and cook for 7 to 8 minutes longer or until eel is done and fork tender. If sauce is too thin, thicken with a small amount of flour or cornstarch. After eel has reached room temperature, refrigerate and serve very cold. Serves 3.

Potato Salad

5 cups cooked, sliced potatoes
2 teaspoons salt (more if needed)
2 teaspoons sugar
1 tablespoon celery seed
2 teaspoons vinegar
1/2 cup mayonnaise
1/2 cup sour cream
4 hard-cooked eggs, quartered

Sprinkle potatoes with seasonings and vinegar. If you wish, also add 1 cup sliced celery and 1/2 cup sliced sweet pickle. Add mayonnaise and sour cream and toss to mix. Fold in eggs. Garnish with wedges of fresh tomatoes. Chill well and serve the same day. Serves 8.

Note: Lite mayonnaise and lite sour cream can be used.

Peas Vinaigrette

2 packages (10 ounces each) frozen, tiny peas, defrosted
1/2 cup vegetable oil
3 tablespoons vinegar
2 tablespoons finely chopped scallions
2 tablespoons finely chopped sweet pickles
1 tablespoon minced parsley
1 tablespoon diced pimento
Salt and pepper to taste

Place defrosted peas in a bowl. Combine remaining ingredients in a small jar. Cover and shake well. Pour dressing over peas and let stand in refrigerator for 2 hours. Before serving, toss lightly with fork. Serves 6.

***Nectarine Pandowdy**

Filling
6 large nectarines (about 2 pounds)
1 teaspoon lemon juice
1/2 cup light brown sugar, or to taste
1/2 teaspoon cinnamon

Peel and cut the nectarines into thick slices into a large bowl. Combine them gently with the lemon juice, sugar and cinnamon. Let stand for 10 to 15 minutes. Preheat the oven to 425 degrees and butter a 1-1/2 quart shallow baking dish. Set aside.

Pastry
3/4 cup flour
1-1/2 teaspoons baking powder
2 tablespoons sugar plus 1 tablespoon for sprinkling over pastry
Pinch of salt
4 tablespoons butter, cut into small pieces
1/3 cup milk
1/2 teaspoon vanilla extract

In a medium-sized bowl, combine all the dry ingredients well. Cut the butter with a pastry blender until the mixture has a crumbly texture. Add the milk and vanilla and combine. Do not overmix or the pastry will toughen. Roll out on a lightly floured surface in a circle about 1/2 inch larger than your baking dish. Put the fruit into the bottom of the prepared dish and cover with the pastry crust. Roll up the edges to form a thick crust, and crimp with your fingers or the tines of a fork. Slash the top with a knife in 2 or 3 places, sprinkle the surface with the remaining sugar, and add a few shakes of cinnamon if you wish. Bake for 25 minutes or until the pastry is golden. Let cool slightly. To serve, spoon the crust, fruit and sauce onto individual serving plates. Serves 5 to 6.

* This recipe is from *Fresh Fruit Desserts: Classic & Contemporary*, by Sheryl & Mel London, Prentice Hall Press, 1990. □

By Spike Knuth

Blackbird Invasion

It's blackbird time again! One of the common sights of late summer in the mornings and evenings, are the huge flocks of blackbirds going to feed or coming back to roost. Each morning August through September, they'll head out to feed in the croplands. Toward sunset and through the hours of dusk, they return to roost, usually in the tall, mature trees along a large river such as the James, Rappahannock or Pamunkey, or in the swamps and bottomlands of rivers like the Chickahominy. The flocks are made up of at least hundreds and more often, thousands of birds, flying in long, diagonal, undulating ribbons that often seem to have no end.

Based on a 1974 count, the national population of blackbirds is estimated to be well over a half billion birds at mid-winter. These flocks of "blackbirds" actually may consist of up to six different species. They include redwinged blackbirds, common grackles, brown-headed cowbirds and starlings and sometimes rusty blackbirds and Brewer's blackbirds. It's not unusual for English sparrows, crows and even robins to tag along!

Blackbirds have not, in years past, endeared themselves to the agricultural community. Blackbirds not only swarm to harvested fields to glean leftovers, but are guilty of pulling young shoots of corn in spring, and dining on corn in its milk stage in summer, ruining thousands of acres in the process. In Virginia there was a time when drying peanuts were not safe from marauding blackbirds. At times, they'd beat cattle to the feeding troughs. A study back in 1976 in Tennessee showed that blackbirds were eating about $3000 worth of cattle feed a day! In 1979, in Pennsylvania alone, immense flocks of blackbirds destroyed an estimated $15 million worth of corn, grapes and other crops, according to the National Wildlife Federation.

An estimated 77 million blackbirds wintered annually in those days in western Kentucky and Tennessee, which some natives said was always so. On one occasion in the early 1900s, a marsh was torched to try to get rid of nesting blackbirds. Fort Campbell, Kentucky alone had a roost of 10 million birds, which constituted a threat to military and civilian aircraft. Another roost at the Milan Army Ammunition Plant, Tennessee, in 1976 numbered nine million! Sixty-two people died when a flock of blackbirds caused an airliner to crash on its approach to the Boston airport. Here in Virginia, the Great Dismal Swamp hosts a roost of about 20 million blackbirds each winter!

While blackbirds still do cause some agricultural damage, there are not as many complaints in Virginia as there were in the 1970s, according to Phil Eggborn, Virginia Department of Agriculture Consumer Services. Changes in agricultural practices have remedied much of the conflict between bird and farmer. Starlings may get into the feedlots occasionally, but then it's usually during winter when it's cold or snows. "We are now getting more roosting complaints than agricultural damage complaints," said Eggborn. Eggborn doesn't attribute the roosting problem to more birds, but says "they've just spread out more and have formed more roosts."

Why? Why are blackbirds moving into urban and suburban areas? The National Wildlife Federation speculates it's because of the abundance and availablility of mature stands of trees in the parks and streets, coupled with the loss of wetlands, and other rural land changes. Large concentrations of birds have raised concerns about a human disease called histoplasmosis which is caused by a fungus that thrives on bird droppings. However, even during the large concentrations of birds in Kentucky and Tennessee, few if any cases were reported.It seems as if the biggest problems have been the mess, the smell and the noise.

A variety of control methods have been tried, including spraying the birds with detergents which ultimately kills them, and is not generally a popular method. Scare devices, such as carbide canons have been tried but are usually ineffective. Trapping would be next to impossible.

Despite occasional cycles of too many blackbirds, the United States Fish and Wildlife Service recommends "public tolerance" for blackbirds. Having none at all would be even worse! Blackbirds eat prodigious amounts of insects and weed seeds. The next time you walk out in your backyard and are buzzed by Japanese and May beetles, think back to late fall, winter and early spring, when that flock of starlings converged on your yard to pluck out beetle larvae!

Wood Duck

Aix sponsa

Virginia Wildlife Sportsman's Calendar—

on sale today for $6!

April 1993

Calendar runs from September '92-August '93.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					3 Ducks arrive from south (Grace) ☼ 5:53 ❋ 6:33 NEW MOON 10:00A–3:00P	4 Piedmont appl. Season opens ☼ 5:51 ❋ 6:34 11:00A–4:00P
					10 Dogwood Blooming ☼ 6:42 ❋ 7:40 FIRST QUARTER 5:30A–10:30A	11 Rivers, white perch 2 lbs. 1 oz. Rocky Summons, 1987 Beck Bay ☼ 6:41 ❋ 7:41 6:30A–11:30A
12 PALM SUNDAY ☼ 6:39 ❋ 7:42 7:00A–12:00N	☼ 6:38 ❋ 7:43 8:00A–1:00P	☼ 6:37 ❋ 7:43 9:00A–2:00P	15 Crappie spawning ☼ 6:35 ❋ 7:44 10:00A–3:00P	16 Rivers, largemouth 16 lbs. 4 oz. Richard Tate, 1988 Lake Gaston ☼ 6:34 ❋ 7:45 10:30A–3:30P	17 Chinquapin back inshore at Wachapreague GOOD FRIDAY ☼ 6:32 ❋ 7:46 FULL MOON 11:00A–4:00P	18 Spring gobbler season opens Record crappie 4 lbs. 3 oz. Jeff Bates, 1987 Gaston Reservoir PASSOVER ☼ 6:31 ❋ 7:47 12:00N–5:00P
19 Ruby throated hummingbirds return EASTER SUNDAY ☼ 6:30 ❋ 7:48 1:00P–6:00P	20 Turkey nesting ☼ 6:28 ❋ 7:49 2:00P–7:00P	21 Dogwoods nesting ☼ 6:27 ❋ 7:50 3:00P–8:00P	22 Gray trout [illegible] bass ☼ 6:26 ❋ 7:51 3:30P–8:30P	23 Black Drum [illegible] off Cape Charles ☼ 6:25 ❋ 7:52 4:00A–9:00A	24 South Mountain Lake [illegible] April muskie fishing ☼ 6:25 ❋ 7:53 LAST QUARTER 5:00A–10:00A	25 ☼ 6:22 ❋ 7:53 6:00A–11:00A
26 ☼ 6:21 ❋ 7:54 6:30A–11:30A	27 Blooms redbuds Albu. [illegible] Michael Mills, 1986 Evans Pond ☼ 6:19 ❋ [illegible]	28 James Monroe [illegible] birthday Celebration ☼ 6:18 ❋ 7:56	29 Turkey gobbling peaks Bobcat kits are born ☼ 6:17 ❋ [illegible]	30 Vultures [illegible] up Lakes [illegible] to [illegible] ☼ 6:16	VIRGINIA	☼ SUNRISE ❋ SUNSET Shown in prevailing [illegible]

Interesting Animal Activities → 17 Flounder back inshore at Wachapreague

Holidays → GOOD FRIDAY

Sunrise and Sunset → ☼ 6:32 ❋ 7:46

Moon Phases → FULL MOON 11:00A–4:00P

Fishing and Hunting Seasons → 18 Spring Gobbler season opens Record crappie 4 lbs. 3 oz. Jeff Bates, 1987 Gaston Reservoir

PASSOVER ☼ 6:31 ❋ 7:47

Prime Times to Fish and Hunt or Wildlife Watch → 12:00A–5:00P

See gray card in magazine for ordering information or call (804)367-1000.